MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

24 OCTOBER 2018
9.00 a.m. – 11.00a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of six pages with **FIVE** questions.
2. Attempt **ALL** five questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided.
4. **No calculators are allowed**.
5. **You are required to write proper steps to obtain maximum marks.**

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You are required to write proper steps.

Question 1 [10 marks]

a) Simplify the expression and write your final expression as a fraction with no negative exponents.

$$\frac{4x^{-2}(yz)^{-1}}{(-5)^2 x^4 y^2 z^{-2}}$$ (2 marks)

b) Rationalize the denominator for $\frac{6}{3+\sqrt{7}}$ and simplify.

Leave your final answer as $a+b\sqrt{c}$ where a, b and c are integers.

(2 marks)

c) Simplify the following expression and give your final answer as a single fraction.

$$\frac{x}{x-3}-\frac{x+1}{(x-3)(x+8)}$$ (2 marks)

d) Simplify the following expression and give your final expression as a single term.

$$-\sqrt{\frac{25x^2y^2}{49}}+\sqrt[3]{\frac{8x^3y^3}{27}} \quad , \quad x\geq 0,\ y\geq 0$$ (2 marks)

e) Express $\overline{(3+4i)(8+3i)}$ in the form $a+bi$, where a and b are real numbers.

(2 marks)

Continued ...

Question 2 [10 marks]

a) i) Solve the equation $(2x+3)(x-2)=0$.

ii) Solve the inequality $\frac{(2x+3)(x-2)}{x-4} \geq 0$.

Show clearly your Sign Diagram and give your final answer in interval notation.

iii) Find the domain of $h(x)=\frac{(2x+3)(x-2)}{x-4}$.

Give your final answer in interval notation. (5 marks)

b) Solve the equation $|2x-3|-3=4$.

(2 marks)

c) Solve the equation containing radical. Remember to check your answers.

$x-2=\sqrt{12-2x}$ (3 marks)

Continued ...

Question 3 [10 marks]

a) A piecewise function f is defined as $f(x)=\begin{cases} \frac{1}{2}x+\frac{3}{2} & \text{if } -4<x\leq 1 \\ x+3 & \text{if } 1<x\leq 4 \end{cases}$

i) Find $f(-4)$, $f(1)$ and $f(4)$.

ii) Sketch the graph of f. Show clearly all intercepts.

iii) State the domain of f. Write your answer in interval notation.

(5 marks)

b)

i) Use long division to find the quotient and remainder when the polynomial $P(x)=x^3+3x^2-4x-12$ is divided by (x^2+x-6). You are required to state clearly what the quotient and the remainder are.

ii) Factorize completely $P(x)=x^3+3x^2-4x-12$.

iii) Solve $P(x)=0$.

(5 marks)

Continued ...

Question 4 [10 marks]

a) Given a polynomial function $f(x) = -x^3(x-2)(x+2)$.

i) What is the degree of f?

ii) Find the zeros of f and their multiplicities.
At each zero, determine whether the graph of f crosses or touches the x-axis .

iii) Find the y-intercept of the graph of f.

iv) Determine the end behavior of f.

v) Sketch the graph of the function f.
Make sure your graph shows all intercepts and exhibits the proper end behaviour.

(5 marks)

b) Given an exponential function $f(x) = ab^x$ where a and b are constants.
The graph of the function passes through points $(2,\ 6)$ and $(3,\ 8)$.
Find the values of a and b.

(3 marks)

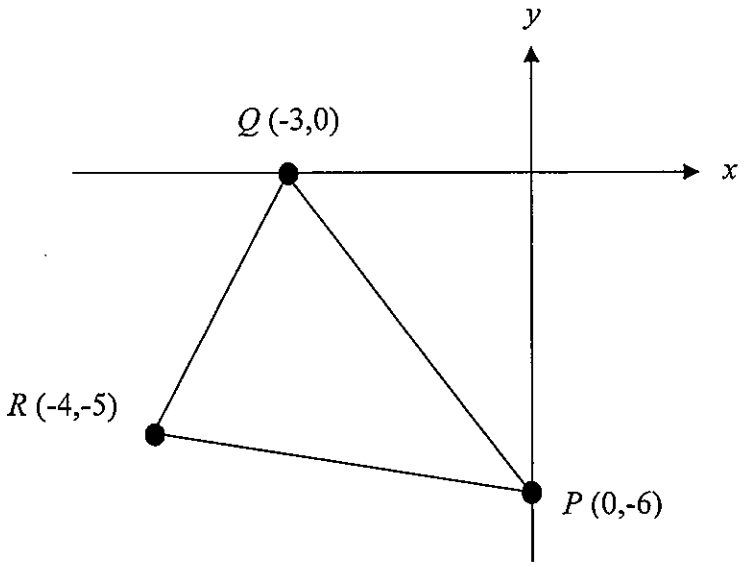
c) Solve the equation $\log_6(x^2 + 5x) = 2, \quad x > 0.$

(2 marks)

Continued ...

Question 5 [10 marks]

a) The diagram below shows a triangle PQR. Point P lies on y-axis and point Q lies on x-axis.



i) Find an equation of the line PQ. Leave your answer in intercept form.

ii) Find an equation of the straight line that passes through R and perpendicular to PQ.
Leave your answer in the form $y = mx + b$ where m is the slope and b is the y-intercept.

iii) Find the point of intersection between lines in part (i) and part (ii).

iv) A point T lies internally on the line PQ such that $PT : TQ = 2:1$.
Find the coordinates of point T.

v) A point $S(x,\ y)$ moves such that its distance is always 5 units from $R(-4,\ -5)$. Find an equation of the locus of S.

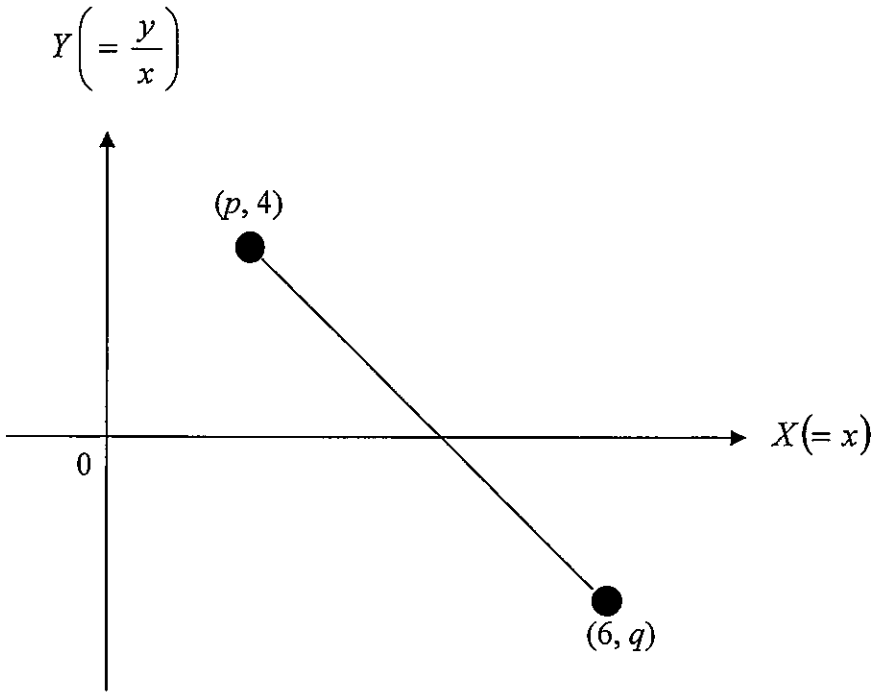
Express your final answer in the form $x^2 + y^2 + bx + cy + d = 0$ where b, c and d are real numbers.

(8 marks)

Continued ...

b) Two variables x and y are related by an equation $y = 12x - 3x^2$.

The diagram below shows a straight line obtained by plotting $Y\left(=\frac{y}{x}\right)$ against $X(=x)$.



Find the values of p and q.

(2 marks)

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